CLAIMS

What is claimed is:

1. An optical recording medium comprising:

a wobbled track on which user data is recorded, wherein a wobble signal recorded on the wobbled track is a single-frequency signal having edge-modulated first header information.

2. The optical recording medium of claim 1, further comprising second header information which is phase-modulated and then recorded in at least a part of an interval of the wobble signal where the first header information has been edge-modulated.

3. The optical recording medium of claim 1, further comprising third header information which is amplitude-modulated and then recorded in at least a part of an interval of the wobble signal where the first header information has been edge-modulated.

4. The optical recording medium of claim 1, wherein the first header information contains addressing information.

5. An apparatus recording a wobble signal on an optical recording medium, the apparatus comprising:

a wobble signal generator generating a single-frequency wobble signal having header information which is edge-modulated based on first and second carrier signals having a same frequency and different edge waveforms; and

a recording unit recording the wobble signal generated by the wobble signal generator on the optical recording medium.

6. The apparatus of claim 5, wherein the wobble signal generator comprises:

a clock generator generating a clock signal;

a carrier signal generator generating the first and second carrier signals based on the clock signal; and

an edge-modulator that receives header information and edge-modulates the header information using the first and second carrier signals output from the carrier signal generator based on the clock signal.

7. The apparatus of claim 6, wherein the edge-modulator transforms high and low levels of digital data representing the header information into the first and second carrier signals, respectively, to modulate the digital data into an analog signal.

8. The apparatus of claim 7, wherein the header information contains addressing information.

9. An apparatus recording a wobble signal on an optical recording medium, the apparatus comprising:

a wobble signal generator generating a single-frequency wobble signal having first and second header information, wherein the first header information is edge-modulated based on first and second signals having a same frequency but different edge waveforms and the second header information is phase-modulated based on the first or second carrier signal; and

a recording unit recording the wobble signal generated by the wobble signal generator on the optical recording medium.

10. The apparatus of claim 9, wherein the wobble signal generator comprises:

a carrier signal generator generating the first and second carrier signals;

an edge-modulator edge-modulating the first header information using the first and second carrier signals;

a phase-modulator phase-modulating the second header information using the first or second carrier signal; and

a signal synthesizer that combines the edge-modulated signal output from the edge-modulator with the phase-modulated signal output from the phase-modulator and outputs the single-frequency wobble signal.

11. A method of recording a wobble signal on an optical recording medium, the method comprising the operations of:

generating first and second carrier signals having a same frequency and different edge waveforms;

generating a single-frequency wobble signal having header information which is edge-modulated using the generated first and second carrier signals; and

recording the generated single-frequency wobble signal on the optical recording medium.

12. The method of claim 11, wherein the operation of generating a single-frequency wobble signal further comprises :

generating a clock signal; and

edge-modulating header information using the first and second carrier signals in accordance with the generated clock signal.

13. The method of claim 12, wherein, the operation of edge-modulating header information comprises transforming high and low levels of digital data representing header information into the first and second carrier signals, respectively, to modulate the digital data into an analog signal.

14. The method of claim 13, wherein the header information contains addressing information.

15. A method of recording a wobble signal on an optical recording medium, the method comprising the operations of:

generating first and second carrier signals having a same frequency and different edge waveforms;

generating a single-frequency wobble signal having first header information which is edge-modulated using the generated first and second carrier signals and second header information which is phase-modulated using the first or second carrier signal; and

recording the generated single-frequency wobble signal.

16. The method of claim 15, wherein the operation of generating a single-frequency wobble signal comprises the operations of:

generating a clock signal;

using the first and second carrier signals to edge-modulate the first header information in accordance with the generated clock signal;

using the first or second carrier signal to phase-modulate the second header information in accordance with the generated clock signal; and

overlapping the edge-modulated signal and the phase-modulated signal to generate the single-frequency wobble signal.

17. A method of reproducing header information from a wobble signal recorded on an optical recording medium, the method comprising the operations of:

reading a single-frequency wobble signal having header information which is edge-modulated by using first and second carrier signals having a same frequency and different edge waveforms;

generating duty signals from the read wobble signal; and

comparing the duty signals to extract header information.

18. The method of claim 17, wherein the operation of generating duty signals comprises the operations of:

generating the duty signals at upper levels of the read wobble signal which are higher than central levels thereof by predetermined levels; and

generating the duty signals at lower levels of the read wobble signal which are lower than the central levels of the read wobble signal by predetermined levels.

19. The method of claim 17, wherein the operation of comparing the duty signals comprises the operations of:

comparing the duty ratios of the duty signals generated in the operations of generating duty signals at upper and lower levels to output binary data; and

extracting the header information from the output binary data.

20. A method of reproducing header information from a wobble signal recorded on an optical recording medium, the method comprising the operations of:

reading a single-frequency wobble signal having header information which is edge-modulated using first and second signals having a same frequency and different edge waveforms;

detecting levels of the read wobble signal at a predetermined phase; and

comparing the detected levels with a predetermined reference value to extract header information.

21. The method of claim 20, wherein the operation of comparing the detected levels comprises the operations of:

comparing the detected levels with a predetermined reference value to output binary data; and

demodulating the output binary data to the extract header information.

22. A method of reproducing header information from a wobble signal recorded on an optical recording medium, the method comprising the operations of:

reading a single-frequency wobble signal having header information which is edge-modulated using first and second carrier signals having a same frequency and different edge waveforms;

generating a differential signal from the read wobble signal; and

extracting the header information based on the generated differential signal.

23. The method of claim 22, wherein the operation of extracting header information comprises the operations of:

detecting an upper envelope signal of the differential signal;

detecting a lower envelope signal of the differential signal; and

extracting the header information based on the upper and lower envelope signals.

24. The method of claim 23, wherein the operation of extracting header information based on the upper and lower envelope signals comprises the operations of:

obtaining a difference signal by subtracting the lower envelope signal from the upper envelope signal;

comparing the level of the difference signal with a predetermined reference value to output binary data; and

demodulating the output binary data to extract the header information.

25. An apparatus reproducing header information from a wobble signal recorded on an optical recording medium, the apparatus comprising :

a wobble signal reading unit reading from the optical recording medium a single-frequency wobble signal having header information which is edge-modulated using first and second carrier signals having a same frequency and different edge waveforms;

a duty signal generator generating duty signals from the read wobble signal; and

a header information extractor comparing the generated duty signals to extract the header information.

26. The apparatus of claim 25, wherein the duty signal generator generates the duty signals at upper levels of the read wobble signal which are higher than central levels thereof by predetermined levels and at lower levels of the read wobble signal which are lower than the central levels thereof by predetermined levels.

27. The apparatus of claim 26, wherein the header information extractor comprises:

a comparator comparing duty ratios of corresponding duty signals generated by the duty signal generator and outputting binary data; and

a demodulator demodulating the header information from the binary data output by the comparator.

28. An apparatus reproducing header information from a wobble signal recorded on an optical recording medium, the apparatus comprising:

a wobble signal reading unit reading a single-frequency wobble signal having header information which is edge-modulated using first and second carrier signals having a same frequency and different edge waveforms;

a level detector detecting levels of the read wobble signal at a predetermined phase; and

a header information extractor extracting the header information by comparing the detected levels with a predetermined reference value.

29. The apparatus of claim 28, wherein the header information extractor comprises:

a comparator comparing the detected levels with a predetermined reference value and outputting binary data; and

a demodulator demodulating the binary data output by the comparator to extract the header information.

30. An apparatus reproducing header information from a wobble signal recorded on an optical recording medium, the apparatus comprising:

a wobble signal reading unit reading a single-frequency wobble signal having header information which is edge-modulated using first and second carrier signals having a same frequency and different edge waveforms;

a differentiator generating a differential signal for the read wobble signal; and

a header information extractor extracting the header information based on the generated differential signal.

31. The apparatus of claim 30, wherein the header information extractor comprises an envelope detector detecting upper and lower envelope signals from the differential signal, wherein the header information extractor extracts the header information based on the upper and lower envelope signals detected by the envelope detector.

32. The apparatus of claim 31, wherein the header information extractor further comprises:

an operator obtaining a difference signal of the upper and lower envelope signals;

a comparator comparing the level of the difference signal obtained by the operator with a predetermined reference value and outputting binary data; and

a demodulator demodulating the output binary data to extract the header information.

33. The apparatus of claim 6, wherein the second carrier signal is a sine wave.

34. The apparatus according to claim 10, wherein the wobble signal generator further comprises:

a clock generator generating a clock signal, wherein the carrier signal generator generates said first and second carrier signals based said clock signal.

35. The apparatus according to claim 27,wherein the demodulator demodulates the header information based on how the header information is encoded.

36. An apparatus recording a wobble signal having header information on an optical recording medium and reproducing header information from the wobble signal recorded on the optical recording medium, the apparatus comprising:

a wobble signal generator generating a single-frequency wobble signal containing header information which is edge-modulated based on first and second carrier signals having a same frequency and different edge waveforms;

a recording unit recording the wobble signal generated by the wobble signal generator on the optical recording medium;

a wobble signal reading unit reading said recorded single-frequency wobble signal having header information which is edge-modulated using first and second carrier signals having a same frequency and different edge waveforms;

a duty signal generator generating duty signals from the read wobble signal;

a header information extractor comparing the generated duty signals and extracting header information.

37. The apparatus according to claim 36, wherein the wobble signal generator comprises:

a clock generator generating a clock signal;

a carrier signal generator generating said first and second carrier signals based on said clock signal; and

an edge-modulator that receives said header information and edge-modulates the header information using said first and second carrier signals output from said carrier signal generator based on said clock signal.

38. A method of recording a wobble signal having header information on an optical recording medium and reproducing header information from the wobble signal recorded on an optical recording medium, the method comprising the operations of:

generating first and second carrier signals having a same frequency and different edge waveforms;

generating a single-frequency wobble signal having header information which is edge-modulated using the generated first and second carrier signals;

recording the generated single-frequency wobble signal on the optical recording medium;

reading said recorded single-frequency wobble signal having header information which is edge-modulated using first and second carrier signals having a same frequency and different edge waveforms;

generating duty signals from the read wobble signal; and

comparing said duty signals to extract the header information.

39. The method according to claim 38, wherein the operation of generating duty signals comprises the operations of:

generating the duty signals at upper levels of the read wobble signal which are higher than central levels thereof by predetermined levels; and

generating the duty signals at lower levels of the read wobble signal which are lower than the central levels of the read wobble signal by predetermined levels.

40. The method according to claim 38, wherein the operation of comparing the duty signals comprises the operations of:

comparing the duty ratios of the duty signals generated in the operations of generating duty signals at upper and lower levels to output binary data; and

extracting the header information from the output binary data.

41. The method according to claim 38, wherein the operation of generating a single-frequency wobble signal further comprises:

generating a clock signal; and

edge-modulating header information using the first and second carrier signals in accordance with the generated clock signal.

42. The method according to claim 41, wherein the operation of edge-modulating header information comprises transforming high and low levels of digital data representing header information into the first and second carrier signals, respectively, to modulate the digital data into an analog signal.